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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/813,892	03/31/2004	Peter N. Comley	38190/274036	5765

826 7590 06/07/2006

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EXAMINER	
BEVERIDGE, RACHEL E	

ART UNIT	PAPER NUMBER
1725	

DATE MAILED: 06/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/813,892	COMLEY ET AL.	
	Examiner	Art Unit	
	Rachel E. Beveridge	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-14,16-25 and 36-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-14,16-25 and 36-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4/13/2006
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

With regard to figures 6 and 7, the replacement drawings were received on April 18, 2006. These drawings are acceptable.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weisert et al. (US 4,882,823) in view of Froes et al. (US 5,024,369).

Weisert discloses an invention for diffusion bonding and superplastic forming hollow components such as aircraft engine components (i.e. gas turbine compressor fan blades) (Weisert, col. 1, lines 5-10). Weisert discloses superplastically forming "reactive" metals including titanium (Weisert, col. 3, lines 49-53) and further teaches a preferred material of Ti-6Al-4V superplastically formed at general temperature ranges including 1450°F-1750°F (Weisert, col. 4, lines 15-18). Weisert also teaches diffusion bonding the preferred Ti-6Al-4V material at 25-300 psi for about 30 minutes (Weisert, col. 4, lines 19 and 28). Furthermore, Weisert discloses flat surfaces (14,20) positioned in abutting relation to each other of to the opposite flat sides of the intermediate flat core sheet (24), and teaches subjecting the sheets (12,18,24) to diffusion bonding conditions

in appropriate tooling (27) to bond the flat surfaces (14,20) to each other or to the core sheet (24) other than where the stop-off material was applied, thereby forming a diffusion bonded sandwich (29) (Weisert, col. 4, lines 56-64). See figure 2B. Weisert also discloses that superplastic behavior enhances formability under compressive strain conditions (Weisert, col. 3, lines 47-49). Therefore, the properties and method of invention are so similar with that of the applicant's claimed invention it is necessarily present to arrive at the specified strain rates of claims 11 and 12. However, Weisert lacks disclosure of specific grain sizes for the titanium blank. Froes discloses the production of superplastically formed and diffusion bonded components requiring titanium alloy sheets and foils with uniform and fine grain structure (Froes, col. 2, lines 9-11). Froes also teaches Ti-6Al-4V as a suitable alloy for the disclosed process (Froes, col. 3, lines 55-58) and discloses an average grain size of about 2 to 20 microns (Froes, col. 4, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Weisert to include the grain size restraints of Froes in order to permit fabrication of airframe and engine structures with significant cost and weight reduction (Froes, col. 2, lines 6-8).

Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weisert et al. (US 4,882,823) and Froes et al. (US 5,024,369) as applied to claim 1 above, and further in view of Stacher (US 5,118,026).

Weisert and Froes lack disclosure of pickling the surface of the workpiece to remove any formed oxide during the superplastic forming step. Stacher discloses the

fabrication of titanium aluminide sandwich structures that combines the process of metal joining and superplastic forming (Stacher, col. 3, lines 26-29). Stacher states that titanium is particularly sensitive to oxygen, nitrogen, and water vapor content in the air at elevated temperatures (Stacher, col. 2, lines 33-35). Stacher further teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Weisert and Froes to include the pickling step of Stacher in order to significantly lower the cost, difficulty, and time involved in diffusion bonding and superplastic forming titanium alloy structures (Stacher, col. 3, lines 30-36).

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weisert et al. (US 4,882,823) and Froes et al. (US 5,024,369) as applied to claim 6 above, and further in view of Stacher (US 5,118,026).

With regard to claim 7, Stacher teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). Furthermore, Weisert's invention includes the same properties and method of the claimed invention. Thus, with the combined invention of Weisert, Froes, and Stacher it is obvious to arrive at the claimed pickling rate. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the

combined invention of Weisert and Froes to include the pickling step of Stacher in order to significantly lower the cost, difficulty, and time involved in diffusion bonding and superplastic forming titanium alloy structures (Stacher, col. 3, lines 30-36).

Regarding claim 8, Stacher teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). Furthermore, Weisert's invention includes the same properties and method of the claimed invention. Thus, with the combined invention of Weisert, Froes, and Stacher it is obvious to arrive at the claimed amount of oxide to be removed from the surfaces. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Weisert and Froes to include the pickling step of Stacher in order to remove an accurate amount of oxide to obtain the maximum obtainable joint strength (Stacher, col. 2, lines 50-53).

With respect to claim 9, Stacher teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). Weisert also discloses the average thickness of the diffusion bonded sandwich between 5 mils (thousands of an inch) and about 150 mils (Weisert, col. 5, lines 6-10). Furthermore, Weisert's invention includes the same properties and method of the claimed invention. Thus, with the combined invention of Weisert, Froes, and Stacher it is obvious to arrive at the claimed thickness. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined

invention of Weisert and Froes to include the pickling step of Stacher in order to significantly lower the cost, difficulty, and time involved in diffusion bonding and superplastic forming titanium alloy structures (Stacher, col. 3, lines 30-36), and further to modify the combined invention of Weisert, Froes, and Stacher to include the thickness of Weisert in order to obtain a uniform mass distribution (thickness) of the sheets and therefore prevent rupturing of the truss core during superplastic forming (Weisert, col. 5, lines 16-19).

Claims 16-25 and 36-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weisert et al. (US 4,882,823) in view of Froes et al. (US 5,024,369) and Stacher (US 5,118,026).

With respect to claim 16-19, 21-25, 36-39 and 41-44, Weisert discloses an invention for diffusion bonding and superplastic forming hollow components such as aircraft engine components (i.e. gas turbine compressor fan blades) (Weisert, col. 1, lines 5-10). Weisert discloses superplastically forming "reactive" metals including titanium (Weisert, col. 3, lines 49-53) and further teaches a preferred material of Ti-6Al-4V superplastically formed at general temperature ranges including 1450°F-1750°F (Weisert, col. 4, lines 15-18). Weisert also teaches diffusion bonding the preferred Ti-6Al-4V material at 25-300 psi for about 30 minutes (Weisert, col. 4, lines 19 and 28). Furthermore, Weisert discloses flat surfaces (14,20) positioned in abutting relation to each other of to the opposite flat sides of the intermediate flat core sheet (24), and teaches subjecting the sheets (12,18,24) to diffusion bonding conditions in appropriate

tooling (27) to bond the flat surfaces (14,20) to each other or to the core sheet (24) other than where the stop-off material was applied, thereby forming a diffusion bonded sandwich (29) (Weisert, col. 4, lines 56-64). See figure 2B. Weisert also discloses that superplastic behavior enhances formability under compressive strain conditions (Weisert, col. 3, lines 47-49). Therefore, the properties and method of invention are so similar with that of the applicant's claimed invention it is necessarily present to arrive at the specified strain rates of claims 22, 23, and 42 and the specified "about 1425°F" of claim 21. However, Weisert lacks disclosure of specific grain sizes for the titanium blank. Froes discloses the production of superplastically formed and diffusion bonded components requiring titanium alloy sheets and foils with uniform and fine grain structure (Froes, col. 2, lines 9-11). Froes also teaches Ti-6Al-4V as a suitable alloy for the disclosed process (Froes, col. 3, lines 55-58) and discloses an average grain size of about 2 to 20 microns (Froes, col. 4, lines 14-15). The combined invention of Weisert and Froes does not disclose pickling the surface of the workpiece to remove any formed oxide during the superplastic forming step. Stacher discloses the fabrication of titanium aluminide sandwich structures that combines the process of metal joining and superplastic forming (Stacher, col. 3, lines 26-29). Stacher states that titanium is particularly sensitive to oxygen, nitrogen, and water vapor content in the air at elevated temperatures (Stacher, col. 2, lines 33-35). Stacher further teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). Thus, it would have been obvious to one of

ordinary skill in the art at the time of the invention to modify the process (including the same properties and method of the claimed invention) of Weisert to include the grain size restraints of Froes in order to permit fabrication of airframe and engine structures with significant cost and weight reduction (Froes, col. 2, lines 6-8), and further to modify the combined invention of Weisert and Froes to include the pickling step of Stacher in order to remove an accurate amount of oxide to obtain the maximum obtainable joint strength (Stacher, col. 2, lines 50-53) and to significantly lower the cost, difficulty, and time involved in diffusion bonding and superplastic forming titanium alloy structures (Stacher, col. 3, lines 30-36).

With respect to claims 20 and 40, Stacher teaches that the surfaces require preparatory cleaning (i.e. pickling) (Stacher, col. 2, lines 45-47) and states that further application of pressure breaks up the surface oxides to present clean surfaces for bonding (Stacher, col. 2, lines 53-55). Weisert also discloses the average thickness of the diffusion bonded sandwich between 5 mils (thousands of an inch) and about 150 mils (Weisert, col. 5, lines 6-10). Furthermore, Weisert's invention includes the same properties and method of the claimed invention. Thus, with the combined invention of Weisert, Froes, and Stacher it is obvious to arrive at the claimed thickness. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined invention of Weisert, Froes, and Stacher to include the thickness of Weisert in order to obtain a uniform mass distribution (thickness) of the sheets and therefore prevent rupturing of the truss core during superplastic forming (Weisert, col. 5, lines 16-19).

Response to Arguments

Applicant's arguments filed April 18, 2006 have been fully considered but they are not persuasive.

Applicant argues Froes does not describe grain size dependent upon the type of material to be used, and that Froes does not teach or suggest the grain size as is now recited in claim 1 (pages 9-10) and claim 16 (page 11). The examiner disagrees. Froes teaches Ti-6Al-4V as a suitable alloy for the disclosed process (Froes et al., col. 3, lines 55-58) and discloses an average grain size of about 2 to 20 microns (Froes et al., col. 4, lines 14-15). The examiner reminds the applicant that the claimed range including "about" 0.8-1.2 micron substantially encompasses within 10 percent of the claimed range (therefore, 0.72-1.32 microns). 10 percent of Froes disclosure of "about" 2 microns is "about" 1.8-2.2 microns. 1.32 microns is sufficiently close to 1.8 microns; therefore, it is the examiner's position that the amounts in question are so close that is it prima facie obvious that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 227 USPQ 773.

Applicant argues, "it would not have been obvious to use the thin sheets of rapidly-solidified foil of Froes, et al. to form a structure having varying mass distribution as disclosed by Weisert, et al." (page 10). In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation

to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Weisert to include the grain size restraints of Froes in order to permit fabrication of airframe and engine structures with significant cost and weight reduction (Froes, col. 2, lines 6-8).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., neither reference (Weisert or Froes) disclose surface contouring for achieving mass distribution achieved with rapidly-solidified foil that is about 10-100 millionths of an inch thick (page 10)) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Applicant also argues that Weisert specifically teaches away from the process of achieving a mass distribution by cutting and stacking flat sheet stock (page 10). The examiner reminds the applicant that the MPEP states, "patents are relevant as prior art for all they contain," more specifically stating,

> "The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain." *In re Heck*, 699 F.2d 1331, 1332-33, 216 USPQ 1038, 1039 (Fed. Cir. 1983) (quoting *In re Lemelson*, 397 F.2d 1006, 1009, 158 USPQ 275, 277 (CCPA 1968)).
>
> A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck &*

> *Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied,* 493 U.S. 975 (1989). See also *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed.") MPEP 2123 I.

Applicant argues that Weisert does not teach or suggest the strain rates set forth in claims 11 and 12, and disagrees with the contention that it is "necessarily present" to arrive at the specified strain rates of these claims (page 11). The examiner disagrees. The applicant also states that "a higher strain rate would require higher pressures and/or result in higher stresses" (page 11). See column 4, lines 10-30 of Weisert et al. which contains the material and physical properties of applicant including relevant pressures between 25-300 psi. Furthermore, applicant discloses pressures such as 300 psi within the disclosure of the instant application; thus Weisert's pressures sufficiently encompass applicant's disclosed "high pressures." The examiner also notes that the applicant has not proven the claims to contain materials or properties different from those of Wiesert and Froes; therefore, it remains obvious to one of ordinary skill in the art at the time of invention to achieve the claimed strain rates.

Applicant argues the order of steps with regard to Stacher, and states, "Stacher does not disclose pickling after a superplastic forming operation" (page 12). Although, the examiner agrees with this statement, the applicant does not claim the step must come after the superplastic forming operation (ex. "then" or "and then" language). Furthermore, the combined invention of Weisert and Froes include the claimed method and Stacher generally discloses pickling. Therefore, the instantly claimed invention

remains obvious over Weisert, Froes, and Stacher without any claim language to sufficiently distinguish the steps and there order of execution.

Also, applicant argues that the references do not discloses superplastically forming the structural member at a temperature of about 1425 °F as recited in claim 21 (page 13). The examiner disagrees and reminds the applicant that the claimed range including "about" 1425 °F substantially encompasses within 10 percent of the claimed range (therefore, 1282.5-1567.5 °F). Weisert's disclosed 1450 °F temperature falls within this range; therefore, it is the examiner's position that the amounts in question are so close that is it prima facie obvious that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 227 USPQ 773.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rachel E. Beveridge whose telephone number is 571-272-5169. The examiner can normally be reached on Monday through Friday, 9 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

reb

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PRIMARY EXAMINER